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PATENT  
Docket No. 360842003400

**CERTIFICATE OF HAND DELIVERY**

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*Stephanie R. Mason*  
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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In the application of:

Akira NISHIMURA et al.

Serial No.: 09/079,468

Filing Date: May 15, 1998

For: CLOTH PREPREG AND WET  
PROCESS FOR MANUFACTURING  
THE SAME

Examiner: Christopher C. Pratt

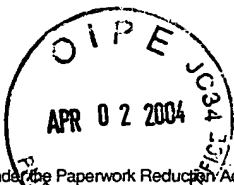
Group Art Unit: 1771

**REPLY BRIEF**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the Examiner's Answer of February 2, 2004, Appellants submit the following argument.



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FEE TRANSMITTAL for FY 2004 <small>Effective 10/01/2003, Patent fees are subject to annual revision.</small>		Complete if Known	
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27		Application Number	09/079,468
TOTAL AMOUNT OF PAYMENT (\$)		Filing Date	May 15, 1998
290.00		First Named Inventor	Akira NISHIMURA
		Examiner Name	C. C. Pratt
		Art Unit	1771
		Attorney Docket No.	360842003400
METHOD OF PAYMENT (check all that apply)		FEE CALCULATION (continued)	
<input type="checkbox"/> Check <input type="checkbox"/> Credit Card <input type="checkbox"/> Money Order <input type="checkbox"/> Other <input type="checkbox"/> None		3. ADDITIONAL FEES	
<input checked="" type="checkbox"/> Deposit Account: Deposit Account Number: 03-1952 Deposit Account Name: Morrison & Foerster LLP		Large Entity Small Entity	
The Director is authorized to: (check all that apply)		Fee Fee Fee Fee Code (\$) Code (\$) Description Paid	
<input checked="" type="checkbox"/> Charge fee(s) indicated below <input checked="" type="checkbox"/> Credit any overpayments		1051 130 2051 65 Surcharge - late filing fee or oath	
<input type="checkbox"/> Charge any additional fee(s) or any underpayment of fee(s)		1052 50 2052 25 Surcharge - late provisional filing fee or cover sheet.	
<input type="checkbox"/> Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.		1053 130 1053 130 Non-English specification	
FEE CALCULATION		1812 2,520 1812 2,520 For filing a request for ex parte reexamination	
1. BASIC FILING FEE		1804 920* 1804 920* Requesting publication of SIR prior to Examiner action	
Large Entity Small Entity		1805 1,840* 1805 1,840* Requesting publication of SIR after Examiner action	
Fee Fee Fee Fee		1251 110 2251 55 Extension for reply within first month	
Code (\$) Code (\$) Description Paid		1252 420 2252 210 Extension for reply within second month	
1001 770 2001 385 Utility filing fee		1253 950 2253 475 Extension for reply within third month	
1002 340 2002 170 Design filing fee		1254 1,480 2254 740 Extension for reply within fourth month	
1003 530 2003 265 Plant filing fee		1255 2,010 2255 1,005 Extension for reply within fifth month	
1004 770 2004 385 Reissue filing fee		1401 330 2401 165 Notice of Appeal	
1005 160 2005 80 Provisional filing fee		1402 330 2402 165 Filing a brief in support of an appeal	
SUBTOTAL (1) (\$) 0.00		1403 290 2403 145 Request for oral hearing 290.00	
2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE		1451 1,510 1451 1,510 Petition to institute a public use proceeding	
Total Claims --** = Extra Claims Fee from below Fee Paid		1452 110 2452 55 Petition to revive - unavoidable	
Independent Claims --** =		1453 1,330 2453 665 Petition to revive - unintentional	
Multiple Dependent		1501 1,330 2501 665 Utility issue fee (or reissue)	
Large Entity Small Entity		1502 480 2502 240 Design issue fee	
Fee Fee Fee Fee		1503 640 2503 320 Plant issue fee	
Code (\$) Code (\$) Description Paid		1460 130 1460 130 Petitions to the Commissioner	
1202 18 2202 9 Claims in excess of 20		1807 50 1807 50 Processing fee under 37 CFR 1.17(q)	
1201 86 2201 43 Independent claims in excess of 3		1806 180 1806 180 Submission of Information Disclosure Stmt	
1203 290 2203 145 Multiple dependent claim, if not paid		8021 40 8021 40 Recording each patent assignment per property (times number of properties)	
1204 86 2204 43 ** Reissue independent claims over original patent		1809 770 2809 385 Filing a submission after final rejection (37 CFR 1.129(a))	
1205 18 2205 9 ** Reissue claims in excess of 20 and over original patent		1810 770 2810 385 For each additional invention to be examined (37CFR 1.129(b))	
SUBTOTAL (2) (\$) 0.00		1801 770 2801 385 Request for Continued Examination (RCE)	
** or number previously paid, if greater; For Reissues, see above		1802 900 1802 900 Request for expedited examination of a design application	
		Other fee (specify)	
		*Reduced by Basic Filing Fee Paid SUBTOTAL (3) (\$) 290.00	
SUBMITTED BY		(Complete if applicable)	
Name (Print/Type) Raj S. Dave		Registration No. (Attorney/Agent)	42,465
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		Date	April 2, 2004

## ARGUMENT

**A. The Examiner's arguments in the Response to Argument on page 4 and 5 of the Examiner's Answer are *not* supported by the evidence and are instead based on hindsight gained from this invention.**

The Examiner has argued that persons of ordinary skill in the art would have been motivated to combine Kishi and Homma to arrive at this invention. However, the Examiner's rationale for finding a motivation to combine Kishi and Homma has continuously changed during the prosecution like a moving target, which should make the Board wonder – Is there a proper motivation to combine Kishi and Homma or is the Examiner playing a Russian roulette?

For example, the Examiner once argued, on page 4, lines 3-5 of the Action of January 1, 2003, that persons of ordinary skill in the art would have been motivated to use Homma's "binder" in Kishi's fabric because "[s]uch a combination would have been motivated by the reasoned expectation of reducing the twist in Kishi's yarns and maintaining long-term flatness." In response, on page 8, from line 4 of the first new paragraph of the Appeal Brief of September 16, 2003, Appellants argued that the Examiner's stated reason for motivation to combine begs the question of why persons of ordinary skill in this art would have been motivated to use Homma's "binder" in Kishi's fabric when Homma does not specifically state that the "binder" improves yarn flatness and Kishi does not even disclose a "binder," which the Examiner has acknowledged. Appellants further argued in the Appeal Brief on page 8, from line 8 of the first new paragraph:

The fact that there might be a "reasoned expectation" as stated by the Examiner that the yarns in Kishi's fabric and Homma's prepreg might have "flatness" is such a general motivation that it does not respond to the evidentiary burden which the Examiner must satisfy to make out a *prima facie* case. Such a motivation is so broad that it does not answer the central question of why, out of all the

references disclosing “binders” -- and there must be thousands of such references -- would a person of ordinary skill in the art choose Homma as the disclosure to look to. The answer is apparent: Without applicant’s disclosure and claims as a roadmap, *no* person of ordinary skill in this art would have chosen Homma’s “binder” for use in Kishi’s fabric. This is classic, impermissible hindsight.

*Id.*

Subsequently, in paragraph 11, lines 1-4, of the Examiner’s Answer, the Examiner provides a *different* motivation to combine Kishi and Homma and states:

Appellant argues that there is no motivation to utilize the binder of Homma in the fabric of Kishi (Appellants arguments, p. 6). However, it is the examiner’s position that the motivation comes directly from Homma. In col. 6, lines 50-55, Homma teaches that the fabric can be impregnated more efficiently if a binder is added by lines.

In light of the different motivations presented by the Examiner at different times of the prosecution to combine Kishi and Homma, the Board might be wondering what really is the prior art related to this invention. The undersigned, who himself has co-edited a book entitled *Processing of Composites* and has published several papers in the area of fiber-reinforced composites, presents an overview of the prior art and this invention, which is related to a cloth prepreg for a fiber-reinforced composite.

The claims on appeal are directed to “[A] cloth prepreg made by a wet process” as recited in the claims. What is a “prepreg?” As persons skilled in this art would understand, a “reinforcing woven fabric may be formed as a prepreg before a preformed [fiber reinforced composite] material ... is produced. The prepreg is made by providing a substance to be a matrix for fiber reinforced composite materials to the reinforcing woven fabric.” Homma, column 5, lines 52-57.

The quality of a cloth prepreg may be judged by several factors, but the three important factors are (1) the ability to impregnate the resin between fibers in a cured composite, (2) the

cover factor and (3) the ability to maintain yarn flatness of the cloth during prepreg manufacturing.

Note that it is the impregnation of the resin between fibers in the *cured composite* that is important, not necessarily whether the fibers in the prepreg are well impregnated. During the fabrication of the composite from resin-impregnated prepregs, the resin flows resulting in either a good or poor impregnation of the resin between fibers, which in turn produces the composite in which the fibers are bridged either by the resin or voids.

The cover factor of a cloth prepreg is a measure of the “openings” between warps and wefts in a cloth prepreg. As explained on page 6, lines 18-23, of the specification, if S1 is the area of the prepreg and S2 is the area of the openings between warps and wefts in the area S1, then the cover factor is defined by the formula:

$$\text{Cover factor, cf} = [(S1-S2)/S1] \times 100$$

The third factor to judge the quality of a cloth prepreg is the ability to “maintain yarn flatness” (as recited in the claims on appeal) of the cloth during prepreg manufacturing. The cloth, particularly a woven cloth, used as the substrate for a cloth prepreg would inherently have certain yarn flatness. As persons of ordinary skill in this art would recognize, it is important to “maintain yarn flatness” of the cloth during prepreg manufacturing. So, the criterion to judge the quality of a cloth prepreg is not necessarily the inherent yarn flatness, but the ability to “maintain yarn flatness.”

Having explained the important quality control parameters of a cloth prepreg, Appellants would now like to explain the progression in the prior art of manufacturing prepreg. Even prior to Kishi, which was filed in 1993, prepregs were made by a *wet process* (which substantially resembles Figure 1 of the specification) by dipping a cloth *without* any line-like binder in a dip

tank. However, it was recognized by persons of ordinary skill in this art that such a wet process had several deficiencies. For example, if the prepreg were wrapped up overly tight on a roll, there was a possibility of resin bleed-out. If the roll was loose, there was a possibility of kinking. The problem of resin bleed-out resulted in a prepreg having a low cover factor due to "openings" between the warps and wefts. On the other hand, the problem of kinking resulted in a decreased ability to maintain yarn flatness of the cloth during prepreg manufacturing.

In 1993, the application issuing as the Kishi patent was filed for an invention of a *non-wet* prepregging process to overcome the problems associated with the *wet* prepregging process practiced then. The *non-wet* prepregging process of Kishi is explained particularly well in Example 1 of Kishi as follows:

An epoxy resin composition having the following composition [as disclosed in a table in Example 1 of Kishi] was prepared in a kneader. The resin composition was heated at 80 °C. for a short time and coated on a releasing paper to obtain a resin film. In the following Examples and Comparative Examples, all parts are by weight unless otherwise specified.

This resin film was set in a prepreg machine and impregnated into a plain-woven fabric made of carbon fibers (TORAYCA C07373, commercially available from TORAY INDUSTRIES, INC.) from both sides of the fabric, to obtain a prepreg having a resin content  $W_R$  of 40%. This prepreg had an excellent tackiness and drapability, and its cover factor  $K_p$  was 99%.

A honeycomb panel was fabricated laying-up this prepreg and a photomicrograph of a polished cross-section thereof was taken, which is shown in FIG. 3. In the entire cross-section, pores are not substantially observed and the porosity  $P$  was 0.05%.

As explained in the "BACKGROUND OF THE INVENTION" of the Kishi patent, Kishi recognized the problem of high porosity, which may be associated with low cover factor, of a cloth prepreg made by a *wet* prepregging process, and, thus Kishi's invention relates to a *non-*

wet process in which the prepregs were prepared by laminating the resin films on both sides of the plain woven fabric to form a resin-laminated woven fabric and then pressurizing the resin-laminated woven fabric. Kishi's prepreg of Example 1 had a cover factor  $K_p$  of 99% and Kishi found that in the cured composite "pores are not substantially observed and the porosity  $P$  was 0.05%." *Id.* Accordingly, Kishi did **not** need to pay any attention to decreasing cover factor or improved impregnation.

While it was well-known prior to this invention as stated in Kishi that a cover factor of 99% of a cloth prepreg is desirable, it was *not* known *how* one should obtain such a high cover factor of a *cloth prepreg* made by a *wet process*, particularly while still maintaining yarn flatness of the cloth during prepreg manufacturing. *Appellants were the first to solve this problem and arrive at this invention.* Kishi does not refute this position of Appellants, and the Examiner has *not* provided any evidence to refute this position of Appellants.

Instead, based on hindsight gained from this invention, the Examiner now provides a different *motivation* in paragraph 11, lines 3 and 4, of the Examiner's Answer to combine Kishi and Homma than that provided in the Action of January 1, 2003, stating "Homma teaches that the fabric can be impregnated more efficiently if a binder is added by lines." However, as explained above, persons of ordinary skill in this art would have recognized that Kishi did *not* need to pay any attention to decreasing cover factor or improved impregnation. Furthermore, Kishi relates to a prepreg made by a *non-wet* process, *not* to a prepreg made by a wet process. So why would a person of ordinary skill in the art combine Kishi and Homma? The answer is apparent: Without Appellants' disclosure and claims as a roadmap, *no* person of ordinary skill in this art would have combined Kishi and Homma. This is classic, impermissible hindsight.

Appellants respectfully submit that contrary to what the Examiner suggests, persons of ordinary skill in this art would have considered that the replacement of the resin films on both sides of the plain woven fabric of Kishi with a line-like binder on the plain woven fabric of Kishi and changing the process of manufacturing Kishi's prepreg from a *non-wet* process to a *wet* process would likely deteriorate the prepreg quality by decreasing the cover factor and the ability to maintain yarn flatness. Thus, persons of ordinary skill in this art would rather have been *opposed* to combining the teachings Kishi and Homma rather than having been motivated to combine Kishi and Homma.

Finally, as persons of ordinary skill in this art would have been well aware, the fabrication process of making prepreps and composites is a complex process involving heat, mass, and momentum transfer with simultaneous chemical reaction in a multiphase system with time-dependent material properties and boundary conditions. Thus, it would have been virtually impossible to make any predictions as what would be the effect of combining different features from different references, other than by hindsight as the Examiner has done in combining Kishi and Homma.

### CONCLUSION

For the foregoing reasons, Appellants submit that the obviousness rejection should be reversed.

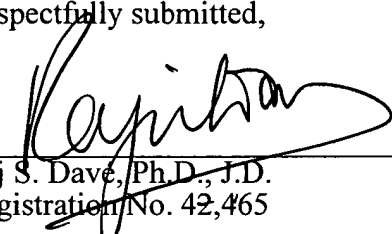


In the event that the transmittal letter is separated from this document and the Patent & Trademark Office determines that an extension and/or other relief is required, Appellants petition for any required relief including extensions of time and authorize the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 03-1952, referencing 360842003400.

Respectfully submitted,

Date: April 2, 2004

By:

  
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